January 1, 2014

Actuarial Valuation Report

Haverhill Retirement System

March 19, 2015

Lawrence B. Stone
President

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March 19, 2015

Haverhill Retirement Board
4 Summer St.
Room 303
Haverhill, MA 01830

Dear Haverhill Retirement Board:

Stone Consulting, Inc. has performed a January 1, 2014 actuarial valuation of the Haverhill Retirement System. This valuation and report was prepared using generally accepted actuarial principles and practices and meets the parameters set by the Governmental Accounting Standards Board Statement (GASB) No. 27. To the best of our knowledge, this report is complete and accurate, and the assumptions used represent our best estimate of anticipated experience of the system.

As part of performing the valuation, Stone Consulting, Inc. was furnished member data by the Haverhill Retirement System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary. In addition, the administrative staff furnished financial statements that were not audited by the actuary or by the plan's auditors.

PERAC and GASB guidelines indicate that actuarial valuations should be conducted at least every other year. The Haverhill Retirement Board conducted their previous actuarial valuation effective January 1, 2012.
The funding objective of the plan is to fully fund the system while attempting to maintain a stable contribution amount for the upcoming fiscal year that is consistent with prior funding schedules or if employer finances allow it, to increase the contribution amount. The Haverhill Retirement Board, with the approval of PERAC, has elected to retain the funding schedule from the prior actuarial valuation, and plans to set the Fiscal Year 2016 appropriation at $15,840,897.

We are pleased to present the results of this valuation. If the Retirement Board has any questions on the content of this report, we would be glad to respond. Please note that this report is meant to be used in its entirety. Use of excerpts of this report may result in inaccurate or misleading understanding of the results.

I, Lawrence Stone, am a consultant for Stone Consulting, Inc. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,
STONE CONSULTING, INC.
Actuaries for the Plan

Lawrence B. Stone
Member, American Academy of Actuaries

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Introduction

This report presents the results of the actuarial valuation of the Haverhill Retirement System. The valuation was performed at the request of the Retirement Board as of January 1, 2014 for the purpose of determining the contribution requirements for Fiscal Year 2016 and beyond. The actuarial results are based on:

- The financial condition of the system as of December 31, 2013
- The benefit provisions of M.G.L. Chapter 32 and related statutes;
- The demographics of members in the system (i.e., active and inactive participants, retirees and beneficiaries as of January 1, 2014);
- Economic assumptions regarding salary increases and investment earnings; and
- Other actuarial assumptions (e.g., withdrawals, retirement, death, etc.)

January 1, 2014 Valuation Summary

	January 1, 2014	January 1, 2012	Change
Contribution Fiscal 2016	$15,840,897	$15,840,897	$0
Funding Schedule Length	19 years	19 years	0 years
Funding Ratio	49% (52% MVA Basis)	49%	0%
Interest Rate Assumption	8.00%	8.00%	0.00%
Salary Increase Rate Assumption	Select and ultimate: 3.00% steps for four years, 3.75% ultimate rate Ultimate rate is reduced to 2.00% for 2014-15, 3.00% for 2016-17	Same, with ultimate rate of 2.00% for 2012-13, 4.25% onward	N/A

- The Fiscal Year 2016 contribution is the same as the planned 2016 contribution. Stone Consulting, with agreement from the Retirement Board, values assets using a four year asset smoothing method. In this approach, asset gains and losses are recognized over a four-year period. The purpose of this approach is to avoid wide swings in asset value from one year to the next.
- The Retirement Board has decided to maintain the existing funding schedule. The actuarial results as funding ratio and actuarial accrued liability which are shown in the report are based on the 1/1/2014 valuation. However, the funding schedule is not based on the valuation results.

The System experienced a 16.0% annual return on the market value of assets versus our assumption of an 8.00% return which resulted in a $11.5 million net actuarial gain. The System's asset portfolio, effective December 31, 2013 is approximately 80% equities, alternative investments, hedge funds and real estate and 20% fixed income and short-term investments. The interest rate assumption was lowered to 8.00% to reflect anticipated market performance.

- The salary increase assumption is based on the following select and ultimate table:

  - 3.00% step increases during the first four years of service *(same as prior valuation)*
  - Ultimate rate of 3.75% *(4.25% in prior valuation)*
  - Ultimate rate reduced to 2.00% for 2014-2015, 3.00% for 2016-2017 *(ultimate rate reduced to 2.00% for 2012-2013 in prior valuation)*

  The change in salary increase assumptions decreased the Accrued Liability by $4.5 million and decreased the Normal Cost by $243 thousand. Total compensation changed by 1.0% over the prior valuation; however average annual compensation (compensation divided by number of active members) changed by 1.6%. This assumption is based on expected future experience.

- The funding level of the Haverhill Retirement System is 49% compared to 49% for the January 1, 2012 actuarial valuation. Using market value of assets the funding level is 52%.

- Non-economic assumptions were changed from the January 1, 2012 actuarial valuation. The mortality assumptions are based upon the RP2000 Table (sex-distinct) projected 19 years with Scale BB. The previous assumption used a 17 year projection with Scale AA. The net effect of this change increased the accrued liability by $7.1 million. We recommend changing this assumption to a Generational projection in the next valuation. Had that change been made in this valuation, it would have generated an additional $6.0 million increase on the accrued liability.

January 1, 2014 Actuarial Valuation Results

	January 1, 2014	January 1, 2012	Percentage Change
Funding			
Contribution for Fiscal 2016	$15,840,897		
Contribution for Fiscal 2016 based on current schedule		$15,840,897	0%
Members *			
▪ Actives			
a. Number	888	894	-0.7%
b. Annual Compensation	$36,807,126	$36,455,272	1.0%
c. Average Annual Compensation	$41,449	$40,778	1.6%
d. Average Attained Age	48.6	48.7	-0.3%
e. Average Past Service	12.9	13.1	-1.2%
▪ Retired, Disabled and Beneficiaries			
a. Number	1,080	1,067	1.2%
b. Total Benefits*	$22,644,809	21,539,518	5.1%
c. Average Benefits*	$ 20,967	$20,187	3.9%
d. Average Age	72.6	72.2	0.5%
▪ Inactives			
a. Number	175	179	-2.2%
Normal Cost			
a. Total Normal Cost	$4,276,136	$4,417,977	-3.2%
b. Less Expected Members' Contributions	3,222,213	3,168,351	1.7%
c. Normal Cost to be funded by the Municipality	$1,053,923	$1,249,626	-15.7%
d. Eighteen month adjustment	67,896	80,504	-15.7%
e. Administrative Expense Assumption	567,000	442,000	28.3%
f. Adjusted Normal Cost and Expense	$1,688,819	$1,772,130	-4.7%

*Excluding State reimbursed COLA

	January 1, 2014	January 1, 2012	Percentage Change
Actuarial Accrued Liability as of January 1, 2014			
a. Active Members	$103,652,384	$101,283,824	2.3%
b. Inactive Members	3,052,656	3,392,736	-10.0%
c. Retired Members and Beneficiaries	213,665,447	201,377,033	6.1%
d. Total	$320,370,487	$306,053,593	4.7%
Unfunded Actuarial Accrued Liability			
a. Actuarial Accrued Liability	$320,370,487	$306,053,593	4.7%
b. Less Actuarial Value of Assets	158,224,632	150,438,455	5.2%
c. Unfunded Actuarial Accrued Liability	$162,145,854	$155,615,138	4.2%
d. Eighteen month adjustment	$6,571,561	$7,553,901	
e. Adjusted Unfunded Actuarial Accrued Liability	$168,717,415	$163,169,039	

- The data was supplied by the Haverhill Retirement Board. The data was checked under broad parameters for reasonableness. With the assistance of the staff of the Haverhill Retirement Board, we were able to develop a database sufficient for valuation purposes.

- Payroll changed by 1.0% over the course of the past year. Average annual compensation changed by 1.6% over the same time period.

- The salary increase assumption includes general wage adjustments, step increases, and promotional increases.

History of Active Participants

Valuation Year	Number	Average Age	Average Past Service	Average Annual Compensation
2014	888	48.6	12.9	$41,449
2012	894	48.7	13.1	$40,778
2010	876	48.3	12.8	$40,065
2008	945	47.2	11.8	$37,516

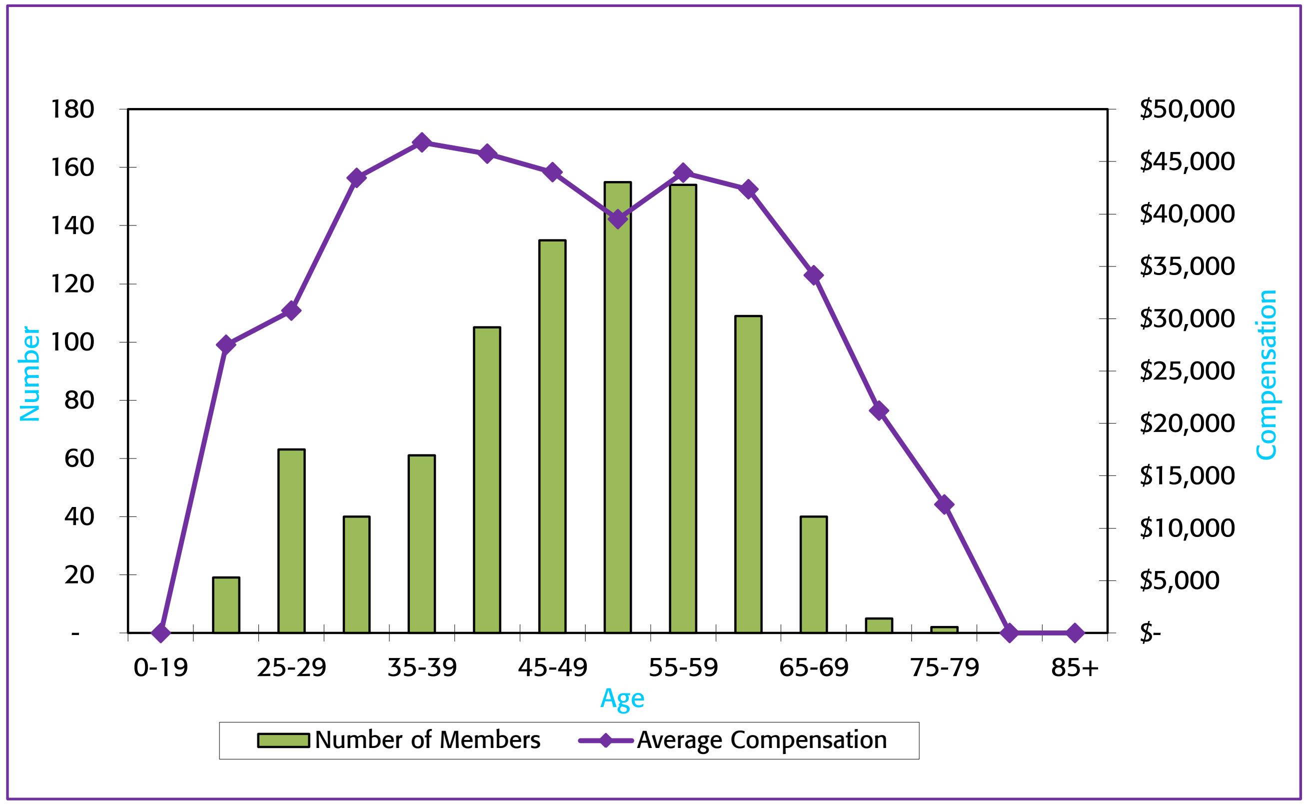
- Employee age has increased by 1.4 years and service has increased by 1.1 years over the past six years. This is consistent with the overall trend towards an aging of the employee population. Average annual compensation has grown by 10.5% (1.7% annually) over the past six years.

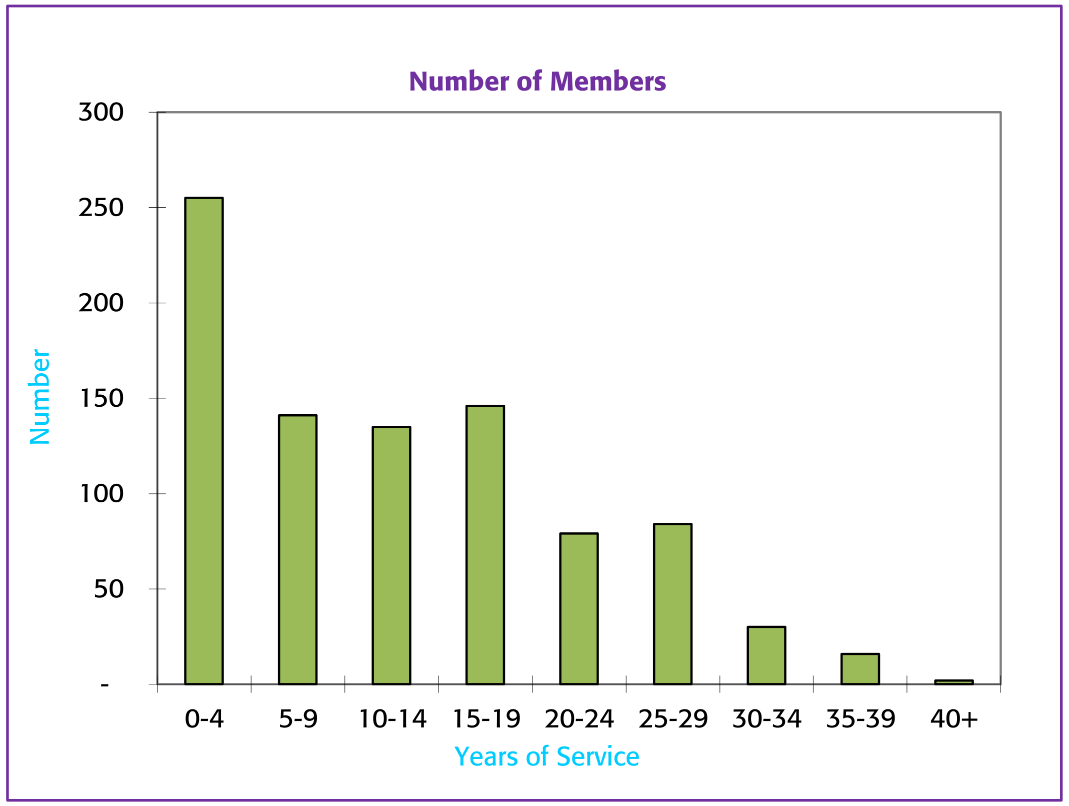
The charts on the following pages summarize demographic information regarding active and retiree members.

Distribution of Plan Members as of January 1, 2014

Active Members

AGE	0-4 Years	5-9 Years	10-14 Years	15-19 Years	20-24 Years	25-29 Years	30-34 Years	35-39 Years	40 + Years	Total	Total Compensation	Average Compensation
0-19	-	-	-	-	-	-	-	-	-	-	$ -	$ -
20-24	19	-	-	-	-	-	-	-	-	19	522,731	27,512
25-29	58	5	-	-	-	-	-	-	-	63	1,939,040	30,778
30-34	21	15	4	-	-	-	-	-	-	40	1,737,958	43,449
35-39	22	17	20	2	-	-	-	-	-	61	2,857,066	46,837
40-44	33	21	21	25	4	1	-	-	-	105	4,804,730	45,759
45-49	33	20	20	36	15	11	-	-	-	135	5,939,596	43,997
50-54	28	24	27	33	17	22	4	-	-	155	6,124,038	39,510
55-59	27	18	20	26	17	25	14	7	-	154	6,767,616	43,946
60-64	10	12	13	17	18	19	10	9	1	109	4,617,512	42,362
65-69	4	7	9	5	7	6	1	-	1	40	1,366,159	34,154
70-74	-	-	1	2	1	-	1	-	-	5	106,145	21,229
75-79	-	2	-	-	-	-	-	-	-	2	24,535	12,268
80-84	-	-	-	-	-	-	-	-	-	-	-	-
85+	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	255	141	135	146	79	84	30	16	2	888	$ 36,807,126	$ 41,449





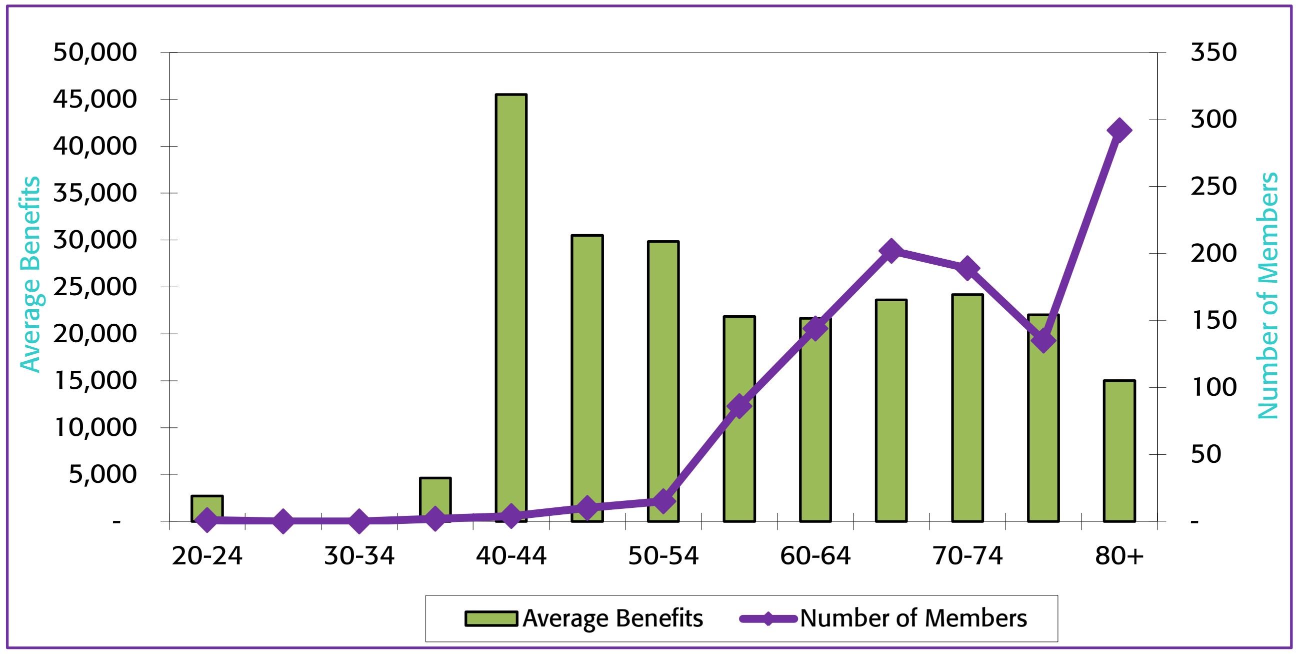
Distribution of Plan Members as of January 1, 2014

Retired Members

Retired Members and Beneficiaries			
Age	Number	Average Benefit	Total Benefit
20-24	1	2,700	2,700
25-29	-	-	-
30-34	-	-	-
35-39	2	4,604	9,209
40-44	1	18,543	18,543
45-49	4	24,353	97,410
50-54	10	20,167	201,670
55-59	76	20,702	1,573,337
60-64	132	20,780	2,742,940
65-69	183	23,203	4,246,231
70-74	172	23,102	3,973,621
75-79	122	20,721	2,527,917
80+	273	14,245	3,888,778
TOTAL	**976**	**$ 19,757**	**$ 19,282,355**

Disabled Members			
Age	Number	Average Benefit	Total Benefit
20-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	3	54,545	163,634
45-49	6	34,641	207,843
50-54	5	49,256	246,278
55-59	10	30,550	305,505
60-64	12	31,546	378,555
65-69	19	27,567	523,780
70-74	17	35,223	598,795
75-79	13	34,450	447,844
80+	19	25,801	490,220
TOTAL	**104**	**$ 32,331**	**$ 3,362,454**

Total			
Age	Number	Average Benefit	Total Benefit
20-24	1	2,700	2,700
25-29	-	-	-
30-34	-	-	-
35-39	2	4,604	9,209
40-44	4	45,544	182,177
45-49	10	30,525	305,253
50-54	15	29,863	447,948
55-59	86	21,847	1,878,842
60-64	144	21,677	3,121,495
65-69	202	23,614	4,770,010
70-74	189	24,193	4,572,416
75-79	135	22,043	2,975,761
80+	292	14,997	4,378,998
TOTAL	**1,080**	**$ 20,967**	**$ 22,644,809**



Benefits shown are net of State reimbursed COLA.

Valuation Methodology

Stone Consulting, Inc. used the Entry Age Normal actuarial funding method in this actuarial valuation. The use of the Entry Age Normal actuarial funding method is consistent with the requirements of Chapter 32 of the Massachusetts General Laws.

NORMAL COST

Valuation Date	January 1, 2014	% of Payroll*
Gross Normal Cost (GNC)	$4,276,136	11.6%
Employees Contribution	$3,222,213	8.8%
Net Normal Cost (NNC)	$1,053,923	2.9%
Adjusted to Beginning of Fiscal Year 2016	$67,896	
Administrative Expense	$567,000	1.5%
Adjusted Net Normal Cost With Admin. Expense	$1,688,819	

*Payroll paid in 2013 for employees as of January 1, 2014 is $36,807,126. Payroll for new hires in 2013 was annualized.

- The gross normal cost (GNC) is the "price" of benefits accruing in the current year if the assumptions underlying the normal cost were realized.

- An individual normal cost represents that part of the cost of a member's future benefits that are assigned to the current year as if the costs are to remain level as a percentage of the member's pay. Benefits payable under all circumstances (i.e., retirement, death, disability, and withdrawals) are included in this calculation.

- Anticipated employee contributions to be made during the year are subtracted from the GNC to determine employer normal cost, or net normal cost (NNC).

- Administrative expenses added to the NNC. The administrative expense does not include investment manager and custodial fees. These fees are considered part of the interest rate assumption that is net of fees.

Actuarial Accrued Liability and Funded Status

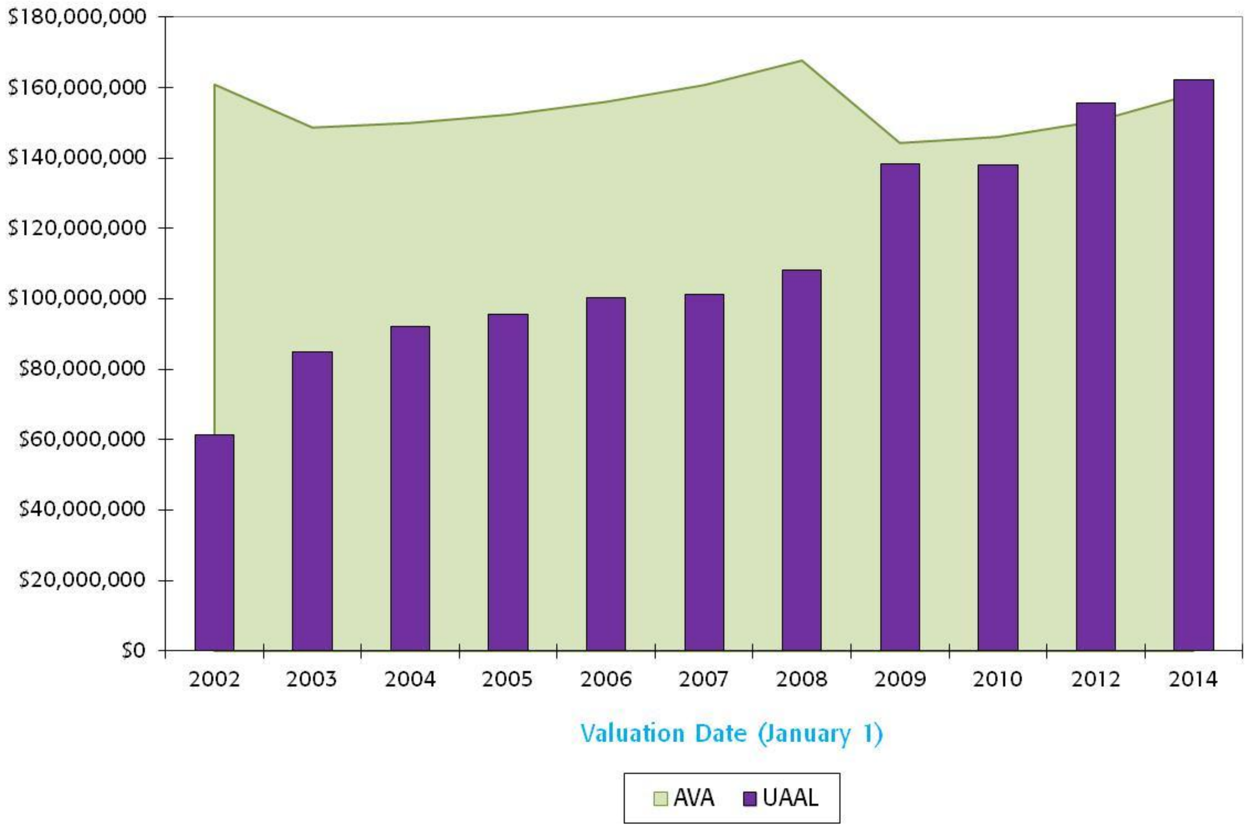
		January 1, 2014	Percentage Change
Active Actuarial Accrued Liability			
Superannuation	95,195,024		
Death	2,070,687		
Disability	5,692,485		
Withdrawal	694,188		
Total		$103,652,384	2.3%
Retiree, Inactive, Survivor and Beneficiary Actuarial Accrued Liability			
Retirees and Beneficiaries	179,461,352		
Disabled	34,204,095		
Inactive	3,052,656		
Total		216,718,103	5.8%
Total Actuarial Accrued Liability (AAL)		$320,370,487	4.7%
Actuarial Value of Assets (AVA)		158,224,632	5.2%
Unfunded Actuarial Accrued Liability		$162,145,854	4.2%
Funded Ratio (AVA / AAL)			
2014 (8.00% interest rate):		49%	
2012 (8.00% interest rate):		49%	

- Actuarial Accrued Liability (AAL) is the "price" of benefits attributable to benefits earned in past years, or in other words, represents today's value of all benefits earned by active and inactive members.

- The total AAL is $320,370,487. This along with an actuarial value of assets of $158,224,632 produces a funded status of 49%. This compares to a funded status of 49% for the 2012 valuation.

- The chart on the following page is a history of the unfunded actuarial accrued liability (UAAL) and the valuation assets (AVA) over the course of the past eleven actuarial valuations.

History of Actuarial Valuation of Assets (AVA) and Unfunded Actuarial Accrued Liability (UAAL)



Fiscal Year 2016 Contribution

The Haverhill Retirement Board has elected to continue using the contribution amounts from the funding schedule from the January 1, 2012 valuation. The contributions from that schedule for the next three fiscal years are presented below.

Fiscal Year	Contribution Amount
2016	$15,840,897
2017	$16,469,879
2018	$17,433,382

Assumptions and Methodology Summary

The principal actuarial assumptions used in this valuation are the same as the assumptions used in the previous valuation, except where noted, and are summarized in the following table:

Valuation Date	January 1, 2014 Valuation
Interest Rate	8.00%
Salary Increase	Select and ultimate: 3.00% steps for four years, 3.75% ultimate rate. Ultimate rate is reduced to 2.00% for 2014-15, 3.00% for 2016-17
COLA	3% of $12,000
COLA Frequency	Granted every year
Mortality	RP-2000 table (sex distinct, healthy employees for actives and healthy annuitants for retirees) projected 19 years with scale BB. For members retired under an Accidental Disability (job-related), 40% of deaths are assumed to be from the same cause as the disability. Disabled mortality is the healthy retiree table ages set forward 2 years. *(Prior valuation used RP2000 projected 17 years with scale AA.)*
Overall Disability	
Retirement Rates	Groups 1 and 2: Ages 55 – 70, Group 4: Ages 50 – 65 Post April 1, 2012 Hires: Groups 1 and 2: Ages 60 – 70, Group 4: Ages 50 – 65
Administrative Expense	$567,000 budget estimated for FY 2016 provided by Haverhill Retirement Board.

Overall Disability:

	Ordinary	Accidental
Groups 1 and 2	45%	55%
Group 4	10%	90%

Assets

a.	Cash	$1,972,479.38
b.	Fixed Income	5,765,175.04
c.	Equities	38,994,155.30
d.	Pooled Domestic Equity Funds	20,508,158.56
e.	Pooled International Equity Funds	30,824,523.75
f.	Pooled Domestic Fixed Income Funds	23,531,936.31
g.	Pooled Alternative Investments	7,047,004.62
h.	Pooled Real Estate Funds	19,518,019.60
i.	Sub-Total:	$165,609,033.13
j.	Interest Due and Accrued	$70,693.93
k.	Accounts Receivable	1,628,059.07
l.	Accounts Payable	(284,289.86)
m.	Sub-Total:	$1,414,463.14
n.	Market Value of Assets [(i) + (m)]	$167,023,496.27

- We were furnished with the System's annual report by the Board. The market value of assets as of December 31, 2013 (adjusted for payables and receivables) is $167,023,496.27.

- The asset allocation as of December 31, 2013 was approximately 20% cash, receivables, payables and fixed income and 80% equities, alternative investments, hedge funds and real estate.

- Historically, 10 to 11% has been the expected long-term rate of return for equities, and 6% to 7% has been the expected long-term rate of return for fixed income securities. Many economists and investment professionals are projecting lower returns of 7.00% to 8.50% for domestic equities, 8.25% to 8.50% for international equities, 9.50% for emerging markets, 8.00% for hedge funds, 10% for venture capital, 6.00% for real estate and 4.50% for core fixed income securities. In light of these projections, as well as historical investment returns, the 8.00% interest rate assumption is within the reasonable assumption range. We encourage close monitoring for changes in investment performance against expectations.

Calculation of Valuation Assets

1. Market value of assets including receivable/payable as of 01/01/2014 — $167,023,496.27

2. Phase-in of asset gains and losses

	Plan Year (1)	Original Amount (2)	Percent Unrecognized (3)	Amount Unrecognized (2) x (3)
a.	2013	$11,471,357	75%	$8,603,518
b.	2012	$6,741,010	50%	$3,370,505
c.	2011	($12,700,636)	25%	($3,175,159)
d.	2010	$7,700,742	0%	$0
e.	2009	$15,645,557	0%	$0
f.	Total			

3. Valuation assets without corridor as of 01/01/2014 — $158,224,632
   (1. - 2.f.)

4. Corridor Check
   a. 90% of Market Value — $150,321,147
   b. 110% of Market Value — $183,725,846

5. Valuation assets with corridor as of 01/01/2014 — $158,224,632

6. Calculation of return on valuation assets
   a. Valuation assets as of 01/01/2012 — $150,438,455
   b. ER contribs + EE contribs - Ben Pymts - Expenses — ($12,405,971)
   c. Actual return on valuation assets — $20,192,148
      5. - (6.a. + 6.b.)
   d. Weighted value of valuation assets — $140,928,653
   e. Return on valuation assets — 14.3%
      6.c. / 6.d.
   f. Annualized return on valuation assets — 6.9%

Disclosure Information Under GASB Statement 25

SCHEDULES OF FUNDING PROGRESS
(Dollars In Thousands)

Actuarial Valuation Date	Actuarial Value of Assets A	Actuarial Accrued Liability B	Unfunded AAL (UAAL) B-A	Funded Ratio A/B	Covered Payroll C	UAAL as a % of Covered Payroll (B-A)/C
1/1/2014	$158,225	$320,370	$162,145	49%	$36,807	441%
1/1/2012	$150,438	$306,054	$155,615	49%	$36,455	427%
1/1/2010	$146,004	$284,160	$138,156	51%	$35,097	394%
1/1/2009	$144,292	$282,522	$138,230	51%	$38,301	361%
1/1/2008	$167,717	$275,805	$108,088	61%	$36,828	293%

Notes to Schedules

Additional information as of the latest actuarial valuation follows:

Valuation date	1/1/2014
Actuarial cost method	Entry Age Normal
Amortization method	
Remaining amortization period	19 years for the fresh start base
Asset valuation method	Market value adjusted by accounts payable and receivables adjusted to phase in over 4 years investment gains or losses above or below the expected rate of investment return. The actuarial value of assets must be no less than 90% of the adjusted market value nor more than 110% of the adjusted market value. Market value of assets is $167,023,496.27.

Actuarial Assumptions

Investment rate of return	8.00% per year
Projected salary increases	Select and Ultimate 3.00% steps for four years, 3.75% ultimate rate. Ultimate rate is reduced to 2.00% for 2014-15, 3.00% for 2016-17

PERAC Information Disclosure

The most recent actuarial valuation of the System was prepared by Stone Consulting, Inc. as of January 1, 2014

The normal cost for employees on that date was:	$3,222,213	8.8% of payroll
The normal cost for the employer was:	$1,053,923	2.9% of payroll

The actuarial liability for active members was:	$103,652,384
The actuarial liability for retired members was (includes inactives):	$216,718,103
Total actuarial accrued liability:	$320,370,487
System assets as of that date (market value: $167,023,496.27):	$158,224,632
Unfunded actuarial accrued liability:	$162,145,854

The ratio of system's assets to total actuarial liability was:	49%

As of that date the total covered employee payroll was:	$36,807,126

The principal actuarial assumptions used in the valuation are as follows:

Investment Return:	8.00% per annum
Rate of Salary Increase:	Select and ultimate

SCHEDULE OF FUNDING PROGRESS (Dollars in $1,000's)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b-a)/c)
1/1/2014	$158,225	$320,370	$162,145	49%	$36,807	441%
1/1/2012	$150,438	$306,054	$155,615	49%	$36,455	427%
1/1/2010	$146,004	$284,160	$138,156	51%	$35,097	394%
1/1/2009	$144,292	$282,522	$138,230	51%	$38,301	361%
1/1/2008	$167,717	$275,805	$108,088	61%	$36,828	293%

Actuarial Methods and Assumptions

ACTUARIAL METHODS

Actuarial Cost Method

The Entry Age Normal Actuarial Cost Method has been used in this valuation. Under this method, the normal cost is the amount calculated as the level percentage of compensation necessary to fully fund the prospective benefits from each member's entry age to retirement age.

The actuarial accrued liability represents the theoretical accumulation of all prior years' normal costs for the plan members as if the program had always been in effect. The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over plan assets.

Asset Valuation Method

Market value of assets (adjusted by payables and receivables) adjusted to phase in investment gains or losses above or below the expected rate of investment return over a four-year rolling period. The phase-in is 25% for year one, 50% for year two, 75% for year three and 100% for year four. The actuarial value of assets may be no less than 90%, or more than 110% of the market value of assets plus payables and receivables.

Fiscal Year Adjustment

The actuarial results are adjusted by the valuation interest rate and salary scale to the beginning of Fiscal Year 2016. The unfunded actuarial accrued liability is rolled forward with normal cost and further adjusted by anticipated contributions and interest.

ACTUARIAL ASSUMPTIONS

Investment Return

8.00% per year net of investment expenses.

Salary Increases

3.00% steps for four years, 3.75% ultimate rate. Ultimate rate is reduced to 2.00% for 2014-15, 3.00% for 2016-17.

Actuarial Methods and Assumptions
(Continued)

Withdrawal Prior to Retirement

The rates shown at the following sample ages illustrate the withdrawal assumption. Withdrawal rates are set to zero if the retirement rate at that age is nonzero.

Rate of Withdrawal

Service	Group 1 and 2	Group 4
0	15%	1.5%
1	12%	1.5%
2	10%	1.5%
3	9%	1.5%
4	8%	1.5%
5	7.6%	1.5%
10	5.4%	1.5%
15	3.3%	0.0%
20	2.0%	0.0%
25	1.0%	0.0%
30+	0.0%	0.0%

Disability Prior to Retirement

The rates shown at the following sample ages illustrate the assumption regarding the incidence of disability:

Rate of Disability

Age	Group 1 and 2	Group 4
20	0.01%	0.10%
25	0.02%	0.20%
30	0.03%	0.30%
35	0.06%	0.30%
40	0.10%	0.30%
45	0.15%	1.00%
50	0.19%	1.25%
55	0.24%	1.20%
60	0.28%	0.85%

Disability is assumed to be 45% ordinary and 55% accidental for Group 1 and 2 and 10% ordinary and 90% accidental for Group 4.

Actuarial Methods and Assumptions (Continued)

Rates of Retirement

The rates shown at the following ages illustrate the assumption regarding the incidence of retirement. A member would need to be eligible for the benefit to be assumed to retire. See Summary of Principal Provisions Number 5 for eligibility requirements.

				Hired after 4/1/2012		
Age	Group 1& 2 Male	Group 1 & 2 Female	Group 4	Group 1& 2 Male	Group 1 & 2 Female	Group 4
50	1%	1.5%	2%	0%	0%	1.5%
51	1%	1.5%	2%	0%	0%	1.5%
52	1%	2.0%	2%	0%	0%	1.5%
53	1%	2.5%	2%	0%	0%	1.5%
54	2%	2.5%	7.5%	0%	0%	5%
55	2%	5.5%	15%	0%	0%	10%
56	2.5%	6.5%	10%	0%	0%	7%
57	2.5%	6.5%	10%	0%	0%	20%
58	5%	6.5%	10%	0%	0%	10%
59	6.5%	6.5%	15%	0%	0%	15%
60	12%	5%	20%	25%	30%	20%
61	20%	13%	20%	20%	13%	20%
62	30%	15%	25%	30%	15%	25%
63	25%	12.5%	25%	25%	12.5%	25%
64	22%	18%	30%	22%	18%	30%
65	40%	15%	100%	40%	15%	100%
66	25%	20%	N/A	25%	20%	N/A
67	25%	20%	N/A	25%	20%	N/A
68	30%	25%	N/A	30%	25%	N/A
69	30%	20%	N/A	30%	20%	N/A
70	100%	100%	N/A	100%	100%	N/A

Mortality

The RP-2000 mortality table (sex-distinct) projected 19 years with scale BB.
(*Prior valuation used RP-2000 mortality table projected 17 years with scale AA.).* During employment the healthy employee mortality table is used. Post-employment the healthy annuitant table is used.

Disabled Life Mortality

The RP-2000 mortality table for healthy annuitants (sex-distinct) projected 19 years with scale BB set-forward by 2 years. Death is assumed to be due to the same cause as the disability 40% of the time.
(Prior valuation used RP-2000 mortality table projected 17 years with scale AA).

Actuarial Methods and Assumptions (Continued)

Regular Interest Rate Credited to Annuity Savings Account

2% per year.

Family Composition

Members assumed married with 2 dependent children – one male and one female both age 15; age difference between member and spouse assumed to be 3 years (the male being the older).

Cost-of-Living Increases

A 3% COLA on the first $12,000 of a member's retirement allowance is assumed to be granted every year.

Administrative Expenses

Estimated budgeted amount of $567,000 for the Fiscal Year 2016 excluding investment management fees and custodial fee is added to the Normal Cost.

Step Increases

Step increases are assumed to be part of the salary increase assumption.

Credited Service

All service is assumed to be due to employment with the municipality.

3(8)(c)

Net 3(8)(c) payments are added to the contribution amount, they have not been included in the Accrued Liability. They are assumed to remain constant.

Contribution Timing

Contributions are assumed to be made semi-annually.

Municipality

Refers to the various employers that comprise the Retirement System.

Valuation Date

January 1, 2014.

Summary of Principal Provisions

1. PARTICIPANT

Participation is mandatory for all full-time employees whose employment commences before age 65. There are three classes of members in the retirement system:

- Group 1: general employees
- Group 2: employees in specified hazardous occupations (e.g., electricians)
- Group 4: police and firefighters

2. MEMBER CONTRIBUTIONS

Member contributions vary depending upon date hired as follows:

Date of Hire	Member Contribution Rate
Prior to 1975	5% of Pay
1975 – 1983	7% of Pay
1984 – June 30, 1996	8% of Pay
After June 30, 1996	9% of Pay

Members hired after 1978 contribute an additional 2% of pay over $30,000.

3. PAY

a. Pay

Gross regular compensation excluding bonuses, overtime, severance pay, unused sick pay, and other similar compensation.

b. Average Pay

The average of pay during the three consecutive years that produce the highest average or, if greater, during the last three years (whether or not consecutive) preceding retirement. For members hired after April 1, 2012, five-year averages will be used.

4. CREDITED SERVICE

Period during which an employee contributes to the retirement system plus certain periods of military service and "purchased" service.

5. SERVICE RETIREMENT

a. Eligibility

Completion of 20 years of credited service or attainment of age 55 and completion of 10 years of credited service. If hired prior to 1978 or a member of group 4, attainment of age 55.

Summary of Principal Provisions (Continued)

b. Retirement Allowance

Determined as the product of the member's benefit percentage, average pay and credited service, where the benefit percentage is shown below (maximum allowance of 80% of average pay):

Benefit Percentage	Group 1	Group 2	Group 4
2.5%	65+	60+	55+
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	N/A	49
1.8	58	N/A	48
1.7	57	N/A	47
1.6	56	N/A	46
1.5	55	N/A	45
	Hired after April 1, 2012*		
2.5%	67+	62+	57+
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

*Reduction is .125% for each year early instead of .15% per year for employees with over 30 years of service.

In addition, veterans receive an additional $15 per year for each year of credited service up to 20 years

6. DEFERRED VESTED RETIREMENT

a. Eligibility

Completion of 10 years of credited service.

b. Retirement Allowance

Determined in the same manner as "Service Retirement" section above with the member eligible to start collecting a benefit at age 55, (or age 57 for post-April 1, 2012 hires) or defer until later at his or her discretion. If a member chooses, his or her contributions with interest may be withdrawn. The amount of interest he or she will receive depends on length of service and whether or not the termination of employment was voluntary.

Summary of Principal Provisions
(Continued)

7. ORDINARY DISABILITY RETIREMENT

a. Eligibility

Non-job related disability after completion of 10 years of credited service.

b. Retirement Allowance

Determined in the same manner as "Service Retirement" section and calculated as if the member had attained age 55 (or age 57 for those hired after April 1, 2012), if younger. Veterans receive 50% of pay (during final year) plus an annuity based on accumulated member contributions with interest.

8. ACCIDENTAL DISABILITY RETIREMENT

a. Eligibility

Disabled as a result of an accident in the performance of duties. No age or service requirement.

b. Retirement Allowance

72% of pay plus an annuity based on accumulated member contributions with interest. Also, a dependent's allowance per year for each child. Total allowance not to exceed 100% of pay (75% for members hired after 1987).

9. NON-OCCUPATIONAL DEATH

a. Eligibility

Dies while in active service, but not due to occupational injury.

b. Retirement Allowance

Benefit as if Option C had been elected (see below) and member had attained age 55 (or age 57 for those hired after April 1, 2012) if younger. Minimum monthly benefits provided as follows: spouse - $500, first child - $120, each additional child - $90

10. OCCUPATIONAL DEATH

a. Eligibility

Dies as a result of an occupational injury.

Summary of Principal Provisions
(Continued)

b. Benefit Amount

72% of pay plus refund of annuity savings fund balance. In the case of an accidental disability retiree who dies of the same cause, the beneficiary receives 72% of the last 12 months salary or the current pension amount, whichever is greater.

11. COST-OF-LIVING INCREASES

An increase of up to 3% applied to the first $12,000 of annual benefit. Funded by the Municipality from Fiscal Year 1999. Percentage increase is voted on each year by the Retirement Board. Cost-of-living increases granted during Fiscal Year 1982 through Fiscal 1998 are reimbursed by the Commonwealth.

12. OPTIONAL FORMS OF PAYMENT

- Option A

Allowance payable monthly for the life of the member.

- Option B

Allowance payable monthly for the life of the member with a guarantee of remaining member contributions with interest.

- Option C

Allowance payable monthly for the life of the member with 66-2/3% continuing to the member's beneficiary upon the member's death. If the beneficiary predeceases the member, the allowance amount "pops up" to the non-reduced amount.

Glossary of Terms

- Present Value of Benefits

  Represents the dollar value today of all benefits expected to be earned by current members if all actuarial assumptions are exactly realized.

- Actuarial Cost Method

  The procedure that is used to allocate the present value of benefits between the liability that is attributable to past service (Actuarial Accrued Liability) and that attributable to future service.

Glossary (continued)

- Actuarial Assumptions

  Estimates are made as to the occurrence of certain events that determine the level of benefits to be paid and how long they will be provided. The more important actuarial assumptions include the investment return on assets, salary increases and the rates of turnover, disability, retirement and mortality.

- Actuarial Accrued Liability

  The portion of the Present Value of Benefits that is attributable to past service.

- Normal Cost

  The portion of the Present Value of Benefits that is attributable to benefits to be earned in the coming year.

- Actuarial Assets

  Market value of assets (adjusted by payables and receivables) adjusted to phase in investment gains or losses above or below the expected rate of investment return over a four-year rolling period. The phase-in is 25% for year one, 50% for year two, 75% for year three and 100% for year four. The actuarial value of assets may be no less than 90%, or more than 110% of the market value of assets plus payables and receivables.

- Unfunded Actuarial Accrued Liability

  That portion of the Actuarial Accrued Liability not covered by System Assets.

- PERAC

  Public Employee Retirement Administration Commission, a division of the State government which has regulatory authority over the administration of the retirement system.

- PRIT

  Pension Reserves Investment Trust Fund is the state controlled and administered fund for the investment of assets for members of the retirement system.

- GASB

  Government Accounting Standards Board (issues guidance for disclosure of retirement system liabilities).

Actuarial Breakout by Unit

	Breakouts	Housing Authority	Police & Fire	School	Waste Water	Water	Whittier	All Others	Total
(1)	Participants								
	Active	16	176	436	25	20	63	152	888
	Inactives (Nonvested)	1	0	73	0	0	8	31	113
	Inactives (Vested)	0	1	12	0	0	5	44	62
	Retirees	7	133	232	17	8	34	545	976
	Disabled	0	65	9	0	3	4	23	104
	Total	24	375	762	42	31	114	795	2143
(2)	Payroll of Active Participants	$759,913	$12,238,793	$12,102,146	$1,462,615	$953,616	$2,392,898	$6,897,146	$36,807,126
(3)	Gross Normal Cost								
	(a) Total Normal Cost	78,798	1,814,888	1,324,004	111,351	80,289	228,651	638,155	4,276,136
	(b) Expected Employee Contributions	59,228	1,148,824	1,028,745	120,447	78,562	209,004	577,403	3,222,213
	(c) Net Employer Normal Cost	19,570	666,064	295,259	-9,096	1,727	19,647	60,752	1,053,923
	(d) Interest on Net Normal Cost	1,260	42,910	19,021	-586	111	1,266	3,914	67,896
	(e) Net Employer Normal Cost w Interest	20,830	708,974	314,280	-9,682	1,838	20,913	64,666	1,121,819
	(f) Projected Net Normal Cost from Prior Val	26,842	913,595	404,986	-12,476	2,368	26,949	83,330	1,445,594
	Expenses[1]	8,852	203,879	148,735	12,509	9,019	25,686	71,688	480,368
(4)	Actuarial Accrued Liability	3,758,717	115,293,480	50,693,366	10,593,938	5,529,635	11,548,935	122,952,416	320,370,487
(5)	Assets	1,856,356	56,941,164	25,036,448	5,232,136	2,730,977	5,703,790	60,723,761	158,224,632
(6)	Unfunded Actuarial Accrued Liability (UAL)	1,902,361	58,352,316	25,656,918	5,361,802	2,798,658	5,845,145	62,228,655	162,145,855
(7)	2002 ERI payment	5,258	86,984	69,245	19,690	24,534	3,989	227,252	436,952
(8)	2003 ERI payment	0	108,097	65,009	53,304	19,636	2,046	78,133	326,225
(9)	Fresh Start Amortization[2]	151,955	4,625,227	1,982,341	366,696	184,975	477,607	4,829,422	12,618,223
(10)	Net 3(8)(c)payments[3]	2,752	84,406	37,112	7,756	4,048	8,455	90,013	234,542
(11)	Total Required Employer Contributions (3f)+(7)+(8)+(9)+(10)	195,659	6,022,188	2,707,429	447,478	244,581	544,732	5,379,838	15,541,904
(12)	Fiscal 2016 Cost: (11) adj for semiannual payme	199,423	6,138,042	2,759,514	456,087	249,286	555,211	5,483,334	15,840,897
(13)	Fiscal 2017 Cost	207,341	6,381,760	2,869,084	474,196	259,184	577,257	5,701,057	16,469,879
(14)	Fiscal 2018 Cost	219,471	6,755,099	3,036,928	501,937	274,347	611,027	6,034,573	17,433,382
(17)	Percentage of Total Cost	1.3%	38.7%	17.4%	2.9%	1.6%	3.5%	34.6%	100.0%

[1]Allocated on the basis of Gross Normal Cost

[2]This is the portion of the Fiscal 2016 amortization of the unfunded liability from the 1/1/2012 valuation that is not associated with ERI payments, allocated on the basis of the accrued liability from the 1/1/2014 valuation.

[3]Allocated on the basis of Accrued Liability

NOTE: The Fiscal 2016 contribution is from the funding schedule derived from the 1/1/2012 actuarial valuation. We have allocated the FY2016 contribution on the following basis: The portion of the contribution that is associated with the Net Normal Cost and Administrative Expense was allocated according to each unit's share of the Gross Normal Cost for Haverhill from the 1/1/2014 valuation. ERI payments were allocated according to each unit's share of ERI payments in 2011, and all other components of the contribution were allocated according to each unit's share of the Actuarial Accrued Liability for Haverhill from the 1/1/2014 valuation.